

they were known to stop the street cars by killing the mules in their tracks.

Like the gnat, the mosquito, usually speaking, is not in the habit of wandering of its own accord far afield, and experiments conducted by the Public Health Service near Augusta, Ga. (20), on marked malaria carriers, found that the maximum natural flight from congested areas was one mile, and from less abundant communities not over a half mile, though occasionally the coast mosquitoes, including the New Jersey brand, are borne inland on the wind (21) 20 miles or more from their breeding marshes in a single night. On various barren keys off the coast of Florida mosquitoes have suddenly appeared when the wind is right to bear them from the breeding mainland. But with a change of direction the insects quickly vanish. The Carnegie Institution has made some studies bearing upon this phase of the question (22). A former WEATHER BUREAU observer, Dr. George Paterson, says that while at Sand Key he occasionally observed a swarm of mosquitoes humming about near the ground, brought in by a wind from the neighboring mangrove swamps and mainland breeding grounds. At such times it was necessary to take refuge in the top of the lighthouse, 110 feet from the ground, and thus beyond the altitude of flight of the pests, to escape them.

In the history of the malarial mosquito little is said about the actual spread of the disease through the agency of the wind, but Ealand narrates one notable example (23), stating that while malaria is not a city disease, conditions may thrust it upon a city, as in the case of Washington, D. C. To the south of Washington at one time lay a marshy area, the Potomac Flats, in which great numbers of the anopheles bred and flourished. With the prevailing summer-night breezes from the south the denizens of the marshes, whose voluntary flights would never have taken them so far, found themselves carried lightly along during their active hours to a rich feeding ground among human beings, where they could satisfy their appetites unchecked. Thus Washington became a city of malaria, and continued as such until the reclamation of the Flats.

BIBLIOGRAPHY.

1. Jordan, Kellogg, and Heath. *Animal studies*, 1907, p. 348.
2. The (Barbados) *Agricultural News*, June 2, 1907.
3. J. Henri Fabre. *Insect adventures*, 1917, pp. 49-50.
4. *Monthly Weather Review*, January, 1917, p. 11.
5. Frank Cowan. *Curious facts in the history of insects*, 1865, p. 103.
6. Sir Hans Sloane. *Nat. Hist. of Jamaica*, quoted in *Curious facts in the history of insects*. Cowan, 1865, p. 104.
7. Remy and Brenchley. *Journey to Great Salt Lake City*, 1861, vol. 1, p. 181.
8. L. N. Badenoch. *True tales of the insects*, 1899, p. 115.
9. J. W. Tutt. *Migration and dispersal of insects*. London, 1902, p. 21.
10. *Ibid*, p. 70.
11. *Ibid*, p. 75.
12. *Ibid*, p. 60.
13. *Ibid*, p. 38.
14. *Scientific American*, May 2, 1914, p. 385.
15. F. M. Webster. Some things farmers should know about insects. *Yearbook of the U. S. Dept. of Agr.*, 1908, p. 387.
16. *Weekly News Letter*. U. S. Dept. of Agr., Feb. 5, 1919, p. 19.
17. F. M. Webster. Winds and storms as agents in the diffusion of insects. *Am. Nat.*, vol. 36, 1902, p. 795.
18. C. W. Collins. Dispersion of gipsy moth larvae by the wind. *Bu. Ent. Bul. No. 273*, Aug. 24, 1915, p. 22.
19. F. M. Webster. Winds and storms as agents in the diffusion of insects. *Am. Nat.*, vol. 36, 1902, p. 799.
20. *Scientific American*, Sept. 8, 1917.
21. J. B. Smith. Our insect friends and enemies, 1909, p. 212.
22. S. C. Bell. Insects at Rebecca Shoal and Tortugas. *Papers from Dept. of Marine Bio.*, vol. 12, 1918.
23. C. A. Ealand. *Insects and man*, 1915, p. 96.

EFFECT OF A FLORIDA FREEZE ON INSECTS.¹

The disastrous Florida freeze of February 2-4, 1917, which killed or practically defoliated the citrus trees in Putnam, Volusia, and Marion Counties, and parts of Lake and Orange Counties, and heavily damaged trees in other sections of the State, was of considerable importance in "reducing the numbers of injurious pests which infested the trees." In the section where temperatures as low as 15° or 20° F. occurred the freeze or the falling and drying of the leaves nearly exterminated the rust mite and varieties of white fly and scale insects. Few adult specimens of the various species survived except on fired or otherwise protected groves or individual trees. Of the red scale it is believed that perhaps not more than 1 in 100,000 remained alive. The almost complete extermination of this species by the freeze and its reproduction to billions in six months is a most remarkable biological fact. In some instances there was no need of the usual early spraying yet, singularly enough, in most cases the normal number of insects appeared in the following summer or fall. So, as a rule, the setback in insect life, however great even over the area of maximum freeze, was only temporary.—W. E. H.

ANIMAL WEATHER PROPHETS.

[Reprinted from *Scientific American*, New York, Mar. 20, 1920, p. 324.]

"Mere superstition," so the weather authorities say, are many of the long-distance weather predictions based on the conduct of animals. No one, so far as we know, has compiled a record of these so-called omens, but their number is multiple. They are based on a belief that animals are able to tell months in advance, for example, the character of the coming winter. If hunters bring a story to the effect that squirrels have made heavy stores of nuts, it is taken to mean that a severe winter impends. If early caught fur-bearing animals have a heavy, thick coat, that is another sign of a severe winter, or a thin coat, the contrary. If bird migrations are delayed after the usual date of the southward flight, a sign is seen of an open winter. Numerous other beliefs based on fancied ability of animals to foresee weather conditions months ahead, and base their preparations on them, have wide currency. Sometimes signs are taken from the vegetable world, as for example, the past fall in the Middle West. Corn husks, it was related, were much heavier than usual—that meant a hard winter.

The reasoning, such as it is, in many of these weather signs, is apparent on the surface. In the case of others it isn't, as with the most famous and well-known of them all—the groundhog sign. If Mister Woodchuck on Candlemas day—February 2—sees his shadow, issuing experimentally from his den, then "winter will have another flight." Otherwise an early spring impends.

Observation over a part of a single lifetime would demonstrate most of these weather signs as unreliable, yet they cling on, especially in country districts. It is possible that they do so, in part, because they shadow into animal signs of a different class which really are dependable. From the conduct of animals, accurate weather predictions can, within certain limits, be made.

This dependable class of animal weather signs is uniformly short distance as to prophecy—no longer than the daily newspaper weather forecast. They occur because

¹ "The Effects of the Freeze of Feb. 2-4, 1917, on the Insect Pests and Mites on Citrus," by W. W. Yothers, Bureau of Entomology, Orlando, Fla. From *The Florida Buglist*, vol. 1, No. 3, Dec. 21, 1917.

animals are more sensitive to atmospheric changes than human beings, and sense an approaching weather change hours before it is apparent to man. * * *

One animal barometer in this class, much observed east and west during the summer season, is the swallow. The swallow is insectivorous to the *-nth* degree. Other than insects hardly pass its bill from one season's end to another, and it captures this food on the wing. Thus it happens that as a weather forecaster the swallow on thousands of farms is always ready with an answer.

Swallows flying high indicate fair weather. Swallows flying low presage a storm. The explanation of these "signs" is simple. The relative level at which swallows fly is determined by the whereabouts of insects. The lighter [denser]¹ the atmosphere, as in the case of fair weather or clearing weather, the higher will insects be found, while an oncoming storm, presaged by growing [decreasing]¹ density, forces them to levels near the ground, where the swallows will be noticed in pursuit of them.

¹ Moist air is so frequently thought of as "heavy" that it is a common mistake to refer to it as dense, whereas moist air, volume for volume, is lighter than dry air. Furthermore, since clearing weather is almost invariably associated with falling temperature, decreasing humidity and rising pressure, all of which contribute to *increasing* density, and since the reverse is true with an on-coming storm, it is obvious that the effects described are associated with a tendency in density opposite to that mentioned.—
EDITOR.

It has been observed by New Englanders that ants, sensing an approaching rain, will close the entrance to their small hills, and conversely, as weather clears, will open them. To this extent ants are found reliable forecasters. Instinctively they react to changes in the atmosphere and close their hills for protection against water.

A late fall and winter weather sign, which many country boys using box traps have learned the accuracy of, is furnished by the small coney rabbit, in rare cases by the more wary jack rabbit. These boy trappers note that catches of rabbits are always better just before a storm—the longer and more severe that storm proves, the more numerous the rabbits caught. Here again a change in the atmosphere has warned the rabbit tribe that a spell, during which food will be hard to obtain, is at hand and instinctively to "fill up," even to the point of entering traps they formerly had avoided. Country boys of New England know that if there is ever a time a rabbit will enter a box trap it is just before a snowstorm.

Doubtless other instances in which wild creatures function in the rôle of genuine weather forecasters could be advanced.

ABSTRACTS, REVIEWS, AND NOTES.

THE METEOROLOGICAL MAGAZINE.

[Reprinted from Nature, London, Mar. 18, 1920, p. 83.]

The "*Meteorological Magazine*," an official publication of the *Meteorological Office*, was first issued under its new title about the middle of February. The journal incorporates "*Symons's Meteorological Magazine*" and the "*Meteorological Office Circular*." For convenience in reference, the serial numbers of "*Symons's Meteorological Magazine*" are being carried on. The change has come about through the absorption of the British Rainfall Organization in the Meteorological Office. The cover of the new publication gives the portraits of four pioneers of meteorology, all of whom were associated with the Meteorological Office. Of these Admiral FitzRoy had charge of the Office at its initiation, when it was a branch of the Board of Trade, and Mr. Symons was an assistant 60 years ago, but left after a short period and devoted himself to the collection of rainfall returns, from which evolved later the British Rainfall Organization. Generals Sabine and Strachey were successively chairmen of the Meteorological Office when controlled by the Royal Society. Little change has been introduced into the style and character of the publication, and it is evidently not intended to make any radical alteration. In addition to the interesting article on "Weather in the British Isles" for the preceding month, which has hitherto regularly appeared in *Symons's Meteorological Magazine*, an article is now given on "Weather Abroad," which will doubtless be valued by readers of the journal.

METEOROLOGICAL MEETING AT VENICE.

An announcement has been received from the Italian Meteorological Society that the meeting originally called for September, 1914, but postponed on account of the war, will be held at Venice at a date in October to be

announced in a later circular. The circular says, in part:

The great problems presented by meteorological science having increased in number during the last few years, invite to a friendly meeting all the studios who, either as a duty or out of individual inclination, occupy themselves with meteorology.

The exchange of opinions between colleagues [of different countries] who in these years have been obliged to suspend their studies or continue them amidst not inconsiderable fatigues, the renewed fellowship promise well for a profitable work, directed toward the sole aim of keeping high the flag of science, which is to a certain degree the object of our life.

METEOROLOGICAL STATIONS IN ECUADOR, 1920.

By FREDERIC W. GODING, Consul General.

[Guayaquil, Ecuador, Jan. 12, 1920.]

Recognizing the importance of forecasting weather conditions as practiced in many countries for the benefit of the agriculturist, the technical office of the Association of Agriculturists of Ecuador has inaugurated a similar system throughout the coastal provinces, including the Galapagos Islands. With that object in view 50 farms have been selected at convenient distances, where are being installed maximum and minimum thermometers and pluviometers, with which observations regarding the temperature and rainfall will be recorded daily, and published in a quarterly bulletin. At the end of each year averages of temperature and rainfall of the different sections will be established from these data, and, with the averages of various years, it will be possible to foretell approximately what the weather will be.

While at present it is not possible to foretell weather conditions very long in advance in any country, in the Tropics where climatic changes are usually sudden it will be specially true; yet, by comparing averages of several successive years, valuable advice can be given to those interested on the critical periods of each crop, thus permitting the farmer to calculate in advance the most favorable time to plant and harvest.